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ABSTRACT

This paper examines the still-video camera and its potential impact by looking at recent experiments and by gathering information from some of the few people knowledgeable about the new technology. The paper briefly traces the evolution of the tools and processes of still-video photography, examining how photographers and their work have been defined by the new technology. The paper offers explanations of how still-video images are recorded and processed, as well as accounts of some recent tests by newspaper and wire service photojournalists. Speculation about changes electronics might cause in the "modus operandi" of news photographers, and about how the viewing public perceives images is presented. Possible abuses are considered, especially the increased potential for unethical manipulation with digital images. The paper concludes that the electronic camera brings with it a potential for great positive change because it will allow photojournalists to work faster and provide more complete coverage than before the adoption of still-video technology. Benefits to media organizations because of the elimination of wasteful and time-consuming darkroom processes are also considered. Thirty-two notes are included, and 97 references are appended. (MS)

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STILL-VIDEO PHOTOGRAPHY:
Tomorrow's Electronic Cameras In the Hands of Today's Photojournalists

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STILL-VIDEO PHOTOGRAPHY:

Tomorrow's Electronic Cameras In the Hands of Today's Photojournalists

INTRODUCTION

While describing the condition of their world, photographers always have been linked to the state of existing technology. Photojournalists today are contemplating the almost certain arrival of electronic still-video cameras, which could within the next decade make silver-based film and darkrooms all but obsolete. This paper will examine the still-video camera and its potential impact by looking at recent experiments — including my own experiences at the Republican National Convention in August, 1988 — and by gathering information from some of the few people knowledgeable about the new technology.

To put the discussion in context, this study will briefly trace the evolution of the tools and processes of still-video photography, examining how photographers and their work have been defined by the new technology. Explanations of how still-video images are recorded and processed, as well as accounts of some recent tests by newspaper and wire service photojournalists, will be offered. There will be speculation about changes electronics might cause in the *modus operandus* of news photographers, and about the perception of images by the viewing public.

Finally, because of the newness of still-video as an area of research, a bibliography on the subject, going well beyond the sources used to produce this article, is presented to assist those wishing to learn more about this rapidly evolving electronic technology.

THE EVOLUTION OF STILL-VIDEO DIGITIZATION

With the rumored release of the "Mavica" in 1981, the Sony Corporation alerted the world of photojournalism to the potential of the electronic still-camera, which could record images as magnetic impulses on a video floppy disk.

The concept evolved from the conversion of broadcasting equipment in the mid-1970s from film to magnetic tape, which allowed almost instantaneous reviewing and transmission of images. "ENG" ("Electronic News Gathering") camera crews now speed to unfolding news events in specially-equipped vans and from the scene electronically send sound and moving pictures directly to the television stations across town or across the country.

Still-video is based on the ENG model. Images are captured electronically as digital data by a light-sensitive sensor called a "charged-coupled-device" (CCD), recorded on a reusable two-inch floppy disk and sent quickly by telephone or satellite to the newsroom. Images are formed as patterns of minute "pixels" (the basic electronic picture unit, not unlike the "dot" in a screened halftone), each approximately one-tenth the diameter of a human hair. By eliminating the need for all chemical processes, still-video equipment permits photojournalists to stay in the field to within minutes of deadline before filing their photographs electronically.

Destined for release in 1984, the Mavica never reached the market. Two flaws — a high cost and low image quality — turned the first still-video camera into a pipe dream. The resolution of the Mavica was a meager 250,000 pixels per image, far below the 18-20,000,000 pixels in a conventional 35mm color transparency. But the concept caught the attention of more than 40 camera and electronics manufacturers who recognized its possibilities. After agreeing as a group on certain basic manufacturing standards the various corporations separated to conduct research and development independently.

Canon emerged in 1986 as the leader in the new technology with the first commercially available, fully-integrated, still-video system for recording, selecting and transmitting electronic images. A Japanese newspaper field-tested Canon's prototype electronic camera, the RC-701, at the 1984 Summer Olympics in Los Angeles. Images were recorded as electrical impulses on disk and transmitted to Tokyo within 30 minutes.

In 1987 several major firms began producing complete still-video systems and numerous others developed specialized components. The flurry of activity prompted one

electronics publication early the next year to proclaim that "1988 seems to be shaping up as the breakthrough year for filmless photography."[1]

Among the American newspapers most interested in the emerging still-video technology is *USA Today*, the satellite-driven creation of the Gannett Company. The self-proclaimed "nation's newspaper" from its beginning seven years ago modeled itself on television, using short, human interest stories, color graphics and color photographs to intentionally impart a video-like character to its printed pages.

By beaming a signal via satellite to printing plants across the nation and on several other continents, *USA Today* has developed a readership in all 50 states and overseas. With different deadlines for its various editions, a frequent frustration was the inability to get photographs from breaking news events in time for the first edition's deadline. Often images from television were captured with a special freeze-frame device for front-page display. Despite the newspaper's self-imposed similarity to television, the staff's photographers and editors resented their inability to compete on breaking news with ever-present minicam-equipped broadcast journalists.

Frank Folwell, *USA Today's* assistant director of photography, who had been closely studying developments in still-video, decided in October 1987 that the new technology was ready for testing under deadline conditions. Along with another photographer providing traditional film coverage, Folwell assigned staff photographer Tim Dillon to shoot the entire World Series using a Canon RC-701 still-video camera.

From an indoor night game in Minneapolis, *USA Today* published on its October 19 front page the first two color photographs recorded on a floppy disk and transmitted by telephone to its Roslyn, Virginia, headquarters. Dillon's pair of still-video images — one of smiling Twins fans and another showing the follow-through on a home run swing — demonstrated several current limitations of the technology. The chip's slow "film speed" rating, around ISO 200, coupled with the low level of indoor lighting, made shooting action nearly impossible. Additionally, the camera's small viewfinder and difficult focusing added to technical obstacles. The images selected for publication had to be printed as 4" x 5" hard copies before they could be color-separated. Marginal resolution discouraged cropping or enlargement.

Nonetheless, despite producing images technically inferior to film, the test demonstrated to Folwell that still-video technology offers unequaled speed of transmission and at least a minimal level of reproduction quality. "We had that home run in here . . .

within 12 minutes from the time it happened," he said, rather than the 90 or so minutes that would have been required to process, print and send a color negative image.[2] But further improvements in still-video were necessary, he said in 1987, before it could be considered anything but a last resort.

Nine months later, several new pieces were already in place — a higher resolution Canon camera, a refined Sony digital transmitter and improved Sony Mavigraph printer — in time for the 1988 political conventions in Atlanta and New Orleans. The late-night nature of most significant convention events provided *USA Today* an opportunity to see if any of these improvements were indeed breakthroughs or mere enhancements. Staff photographer Robert Deutsch, who was also scheduled to cover the upcoming Summer Olympics in Seoul, was chosen to test the Canon RC-760 camera at both conventions.

In the overcrowded quarters of Atlanta's Omni dome, Deutsch attempted to shoot still-video and film simultaneously during the Democratic gathering — to get something on disk for the first deadline and then on film for later editions. "We're not going to shoot still-video images when we have plenty of time to process and get our stuff in," said Folwell.[3] Despite some awkward moments juggling systems, the effort worked as planned.

When Sen. Edward Kennedy and his nephew, John Kennedy, Jr., came to the convention podium late one evening, Deutsch made several tightly-framed still-video images. A runner rushed the disk to the newspaper's work space for transmission. "We had two pictures back in Washington in about twenty minutes," said Folwell. "That's pretty hard to beat."[4] The only way to improve on *USA Today's* experiment would have been to get the image back more quickly from the photographer to the nearby media center.

The Associated Press (AP) did just that. Faced on the first night with the possibility that its film runner would get trapped outside the overcrowded dome, technicians rigged a 2,000-feet-long coaxial cable from the center camera stand to AP's facilities across the street. By attaching the cable to a modified Polaroid video camera, AP was able to instantly have a still-image on a computer screen as soon as staff photographer Ron Edmonds in the dome tripped the camera's shutter with a foot pedal. From there the image was transferred to the AP electronic darkroom where it was captioned, enhanced and quickly sent on the wire to subscribers. "I think the whole trip took about eight minutes from the time he snapped the shutter until it was moving on the main line," said Hal Buell, assistant general manager for AP news photos.[5] The quality was marginal, according to

Buell, but the fear of not getting any pictures the first night made the test worthwhile. Only a handful of newspapers published that low resolution image of Jesse Jackson and Rosa Parks. During the rest of the convention AP used Leafax 35 transmitters, which digitize images from conventional color negatives, and for the first time covered a major event without making a print.

Buell said AP is very interested in still-video technology, foreseeing a time in the not-so-distant future when conventional cameras will be relics. "They'd all convert overnight if the resolution would improve," he said.[6]

Late in 1987 Buell and AP announced the creation of a new digital transmission service called "PhotoStream" that "will change forever the way we do our picture business."[7] The new service, which will relay signals to New York by a fiber optics system and via satellite to client newspapers, keeps the picture in digital form as long as possible, maximizing speed and quality. The process and speed of photo transmission has not changed significantly since the birth of AP Wirephoto in 1935. The time needed to transmit a black-and-white photograph has decreased from ten to nine minutes, while a color photograph requires 30-40 minutes to send. The transmission rate in digital form is reduced to less than a minute for black-and-white pictures and to three to four minutes for color. Buell expects PhotoStream to be fully operational late in 1989.

Still-video cameras were again present when Republican delegates convened at the Superdome in New Orleans in August, 1988. At least two news photographers tested Canon's still-video cameras — Deutsch for *USA Today* and the author for the *Columbia Missourian*, the laboratory newspaper of the School of Journalism at the University of Missouri.[8] Canon USA had loaned a still-video camera and playback unit to the University of Missouri's photojournalism sequence. The Republican convention provided a good opportunity to test the Canon system under deadline pressure.

Deutsch again was positioned on the center camera stand, poised to record key, late-breaking moments each evening for the first edition. Though there also were morning sessions on the first two days, the decision to use the electronic camera "forced us to try to get things that were meaningful from the main event, as opposed to earlier in the day," he said. "The still-video gave us the opportunity to get the very last picture in."[9]

Using the Canon RC-760, with an equivalent film speed of only ISO 80, Deutsch was limited to uncomfortably slow shutter speeds. Instead of using the special still-video lenses, he adapted several conventional telephoto lenses to the smaller format, thus

quadrupling his effective focal length. His 300mm lens became a 1200mm lens, but at maximum shutter speed of 1/60, focus had to be steady and sharp — not easy to manage, Deutsch said, with the camera clamped to the rail of the temporary scaffolding platform.

When Senator and Mrs. Dan Quayle appeared with Mrs. Bush one night in the Vice-President's box on the far side of the spacious dome, Deutsch framed the threesome tightly and held his breath. Struggling to maintain steadiness and focus, Deutsch captured an "amazingly good" color photograph that ran on page one the next morning. It ended up being one of the better-looking pictures the newspaper published from the convention, film or still-video. "People at the Canon booth were asking which were the still-video images," Deutsch said. "When you have to ask, you've been a success."[10]

Folwell agreed with the assessment, and attributed the better-than-expected results to a new Sony digital transmitter and improved Mavigraph printer. But the weak link in the system remains the need to make a hard copy print, Folwell said: "We've told Sony and Canon and others for quite some time that we felt that in order for this to be really up to snuff, it's going to have to have direct output to some type of device — Scitex, Linotronic, Autokon or whatever. The important thing is interfacing it to some type of output device that makes separations."[11]

My own experience at the convention made clear some of the limitations Folwell and others have expressed over the current state of the art. I was responsible for sending stories, as well as photographs of local delegates, to the *Missourian* each of the four days. By eliminating the darkroom procedures, the use of still-video saved me time for interviewing and writing. Carrying only one camera, a handful of video floppy disks and two small still-video zoom lenses — an equivalent focal length between them of 44mm-600mm — I realized what a godsend still-video is in terms of portability. But I soon discovered the problem with the small viewfinder, which was compounded by my eyeglasses. Precise focus was difficult to determine, heightened by any subject movement. These limitations force one to be more disciplined with still-video than with film.

With the help of a Canon technician and transceiver in the nearby media center, I transmitted images to a UPI wire photo receiver in Columbia. Our tests at the university had shown that the print quality would be marginal, so images must be simple and composed full frame — cropping only accentuated the coarse resolution.

On two occasions I was able to shoot right up to deadline before hurrying across the street to transmit. It was pure delight not having to perform any chemical wizardry to

see my pictures. I merely inserted the disks one at a time into the transceiver, and while viewing them on the unit's small built-in monitor, noted the best frames on each. The difficult part of editing, aside from reviewing the vertical images sideways, stemmed from the inability to compare similar images from separate disks side by side. Previewing became easier with practice; the time wasted in indecision was less than would have been spent in the darkroom.

The *Missourian* published eight black-and-white images from the convention. According to Canon, it was the first newspaper to cover an ongoing daily event exclusively with still-video. One photograph was published across four columns, which proved to be at least one too many, given the low resolution of the hard copy prints. Overall, the results demonstrate to me that still-video will be the medium of the future for photojournalists covering breaking news. To take our experiments to the next step, we need to input the images into a computer system to enhance their quality before reproduction.

USA Today planned to continue testing still-video at the 1988 Summer Olympics in Seoul, but found most events scheduled conveniently for deadline. Only once did Deutsch and Folwell use the electronic camera, transmitting an image from the stadium literally moments after Carl Lewis competed in the long jump. But while in the Korean capitol they struck a deal to test Sony's newest high-band, high-resolution camera a few weeks later at the World Series in California. High-band recording is the latest improvement, offering a 40-50 percent increase in image quality.

The three-hour time zone difference between coasts required quick transmission from the night games to meet the first deadline. Folwell chose to assign for the first time two still-video photographers for part of the game, equipping Dillon with the new Sony camera from a centerfield outpost and Deutsch with the Canon RC-760 from behind first base. Dillon was assigned to cover the entire game on still-video, while Deutsch shot only until the first edition deadline had passed, and then switched to film.

In centerfield Dillon started with a 600mm lens on the boxy Sony still-video camera, equal to a 2400 mm lens on 35mm, and switched to a 400mm as daylight faded. He boosted the ISO 50 film speed by two stops for maximum shutter speed and had no problem freezing tight action of batters from that vantage point. "Using it from centerfield with all the action coming straight at you," Dillon said, "you could stop almost anything."[12]

After each inning or less, runners would fetch disks from both photographers for quick editing and transmission nearby via Sony's digital system. Depending on the timing of the pickup (and the speed of the courier), according to Deutsch, on a home run swing it was possible for editors to review the disks before the batter rounded third.

Both photographers and Folwell felt that the image resolution from the high-band Sony camera proved to be a step beyond the Canon. Dillon's pictures were "shockingly good," according to Folwell. Based on his initial still-video shooting the previous year, Dillon had predicted it would be at least five years before newspapers considered buying electronic cameras. The 1988 results convinced him that more widespread use among newspapers might be only a couple years away, considering the recent progress by both Canon and Sony. "They're farther ahead than I projected," he said. "I think the image quality this year was so much more superior — they're headed in the right direction and I think it should be there before I expected it."[13]

Over the four-month, four-event period in late 1988 (i.e., the two political conventions, the Olympics and the World Series), *USA Today* published about a dozen still-video images, mostly in color. Each situation was similar in that it was a late-breaking event happening on deadline, so the still-video camera provided the only option for a staff-produced photo. Despite seeing progress over the duration of the tests, Folwell believes the electronic camera will remain a special-assignment camera for the immediate future — at least until such things as a scanner interface, higher resolution and improved "film speed" occur. "My anticipation is that there'll be some developments that will improve it greatly and we intend to be experimenting with that soon," he said.[14] Folwell indicated that *USA Today* is likely in 1989 to be one of the first newspapers to invest in a still-video system, now that third generation equipment is becoming available.

Dillon was more optimistic about the prospect of general assignment duty with the filmless camera. "We use it now because of the delivery time and because of deadlines," he said, "but I can see in the future we'll use it on non-deadline things. The quality was real good . . . good enough that we would use it even though it wasn't a deadline."[15]

It seems clear that recent advances have brought still-video technology close to the brink of acceptability. At this juncture it is fitting to ask how the advent of electronic photojournalism will affect those who will be capturing — and viewing — these digitized images.

WORKING IN THE ELECTRONIC FUTURE

The shortcomings of still-video cameras — marginal image resolution, slow "film speed" and imperfect design — are surely ephemeral problems. During the past year, image quality has improved noticeably; though still far from rivaling film for clarity and detail, it seems nearly acceptable for newsprint reproduction. In Japan, current research involving a related technology, high-definition television, points to resolution possibly equal to, if not better than, film. With high-definition television, interference-free images recorded on digital videotape will be displayed with more than twice the number of scanning lines of information, resulting in a clarity and detail similar to current wide-screen movies. Faster speed is also certain. Perhaps, some have suggested, there will be even a built-in modem for truly instant transmission of digital images.

When such technical feats come to pass, how will photojournalism fare in the "Digital Era?" Will the recording of images on video disks change the way photojournalists work? How might still-video affect the style and substance of pictures? What are the promises and perils of electronic photojournalism?

The advantages of still-video over film are numerous and, for the most part, obvious. Photographers can, as early users have demonstrated, stay on the scene of breaking news right up to deadline, capturing the most timely images possible before transmitting by telephone or satellite to the newsroom. Difficulties with city traffic and the frantic rushing of film back to the lab will be history. By keeping images in digital form from the electronic camera to the press — the long-awaited move to total pagination — image quality will be maximized. The smaller, faster still-video lenses and the practically silent operation of the camera will allow photographers to work more unobtrusively than before. By making film, chemistry, printing paper and darkroom space obsolete, electronic photography should demonstrate a significant cost savings over a relatively short period of time. Storage of digital images on optical laser disks will be simple and convenient. Photographers will spend more time being journalists, less time being technicians — "out of the darkroom and into the newsroom," as the catchphrase puts it. For all of these reasons, editors and photographers have good reason to yearn for the coming of the electronic camera. Yet there are potential side effects that could, if not addressed properly, do photojournalism harm.

First of all, there is a widespread belief that ENG has contributed to a degradation of televised news — and fears that still-photography would suffer in similar fashion. These concerns are made evident in the remarks of John Premack, a cameraman for a Boston television station, at an industry seminar examining the impact of ENG: "The question is not whether to hail ENG as a milestone, but, 'Is ENG going to be a *mill* stone . . . around the necks of television journalists'?"[16]

Lamenting that networks began using technicians rather than photojournalists to operate the new electronic minicams, Premack said that "for every step forward with this exciting new technology, they were taking two steps backward in journalism and photography."[17] The fascination with covering "live" news puts a priority on late-breaking events, he said, rather than on more significant happenings at earlier times. News gathering was happening at a much faster pace, on deadline, leaving less and less time for critical editorial control. Unhappy with the journalistic concessions that he felt had been made to accommodate ENG, Premack charged that "standards and techniques already established have been lowered to meet the limitations of our new toy."[18]

Professor Conrad Smith of Ohio State University in 1982 surveyed news directors from nearly 200 broadcast markets to determine their feelings about ENG's impact on news content. His findings supported Premack's claims: 86 percent of the respondents said that emphasis on technology had influenced content, as well as presentation, and by a four-to-one margin said that its influence was negative.[19]

Another of Premack's frustrations is the impact of instant transmission of images on the photographer's contributions to the final product, a subject already being discussed among still-photographers. Prior to ENG, television camera operators returned to the station to process film and edit it to tell the story as they saw and felt it. By transmitting from the scene, they were removed from the important screening and editing process. "The cameraman's ability to be selective, to record and turn in only what he or she feels is important and useful to the telling of a story, has been compromised by technology," Premack said. "The reporter, producer or editor who screens the tape inherits a new responsibility."[20]

A master's thesis by David M. Lewis at Ohio University in 1983, titled "Electronic Cameras and Photojournalism: Impact and Implications," found a similar omen for still-photographers. Lewis predicted that the electronic transmission of images had the potential "to completely remove the photographer from the editing and selection process . . . the

person receiving them [the images] and operating the electronic darkroom becomes very important .... There is a chance that the person who operates the electronic darkroom could become more important in the picture process than the photographer."[21]

John Long, director of photography at the *Hartford Courant* , hopes such a scenario will not come to pass. As vice president of the National Press Photographers Association, Long has taken part in many discussions about the profession's electronic future. Most of what he sees and hears excites him, but the possibility of photographers losing creative control of their work is a drawback he worries about. "You shoot some things you know you're not going to want others to see — but you shoot them because you want them," Long says. He is concerned that the loss of control might cause photographers to change their shooting styles, to be more cautious if they have no input in editing their work. "It'll be a power struggle," he says, "and I hope the photographers win."[22]

Fred Ritchin, former picture editor of the *New York Times Magazine* and past director of the photojournalism activities of the International Center of Photography in New York, concurs. He is opposed to any technology that removes the photographer from the editing process, charging that it would damage "both the documentary reliability on which photojournalism rests and the role of photographer as intelligent observer."[23]

Ritchin suggests one way for newspaper and magazine photographers to get a sense of how the switch from film to electronics could redefine their jobs and impact visual thinking and expression. "One of the good comparisons is television," said Ritchin. "If you just look at how electronics and new technology have changed TV news — it's changed it a lot. That's one way to start thinking about what's going to happen with still-photography."[24]

Perhaps the greatest concern of Long, Ritchin and many others in photojournalism centers on the increased potential for unethical manipulation with digital images. Photographs that only exist electronically on a floppy disk are extremely malleable, subject to imperceptible manipulations by tinkering with or totally altering an image's pixel structure on a computer. Since there is no image degradation on successive generations, each enhanced version becomes its own original — its own version of "reality." This ability to doctor images electronically threatens to undermine the cornerstone of news photography: its credibility. The crux of the problem, according to a discussion on digital manipulation at the Digital Photography and Editing Conference in Sunnyvale, California, in February, 1989, is who will operate and set the standard for use of the digital

enhancement equipment. Arguing in favor of having visually-trained editorial staff rather than production workers control the digital image-processing systems, David Gray, assistant managing editor for graphics for the Providence *Journal*, repeated a favorite phrase: "Machines don't lie, people do."[25] Citing the increasing pressure on editors to produce slick, eyecatching images, Howard Finberg, assistant managing editor for graphics for the Arizona *Republic* , said, "The reality is that it's not the photographers running the newspapers."[26] According to many of the approximately 400 in attendance in Sunnyvale, the documentary style — the foundation of modern photojournalism — is giving way to a more conceptualized approach, one that emphasizes set-up, choreographed rather than candid images.

Ritchin also is concerned about what he believes to be photojournalism's slide toward mediocrity and irrelevancy in recent decades, declaring it uninspired, if not moribund. The photograph in print, he says, has lost the power and personal vision demonstrated in the picture essays of *Life* in the post-war decade. "There's very little openness, curiosity and sense of discovery in photojournalism these days," Ritchin said. "There's almost a preconceived view of what the world is about."[27] With the advent of digital images, he sees the trend away from compelling, meaningful photographs gaining momentum. Ritchin views the coming of electronics as an almost certain death knell for the integrity of photojournalistic images. Commenting on the computer's ability to alter photographs undetectably, he says that "simply holding a piece of paper that has on it what appears to be a photograph might no longer even imply that an event has occurred."[28]

Another way to measure the possible influence of the new technology on news photographers, said Ritchin, is to look at how computers changed writing. "In some ways it's made people much faster and more efficient," he said, "but we're certainly not getting any deeper or more profound analyses because of the computer. I don't see any reason to expect that to happen."[29]

Artists have already discovered the seemingly unlimited ability to alter or create images with a computer. One practical application perfected by conceptual artist Nancy Burson, as an aid to surgeons and patients, is creating digital "pictures that show exactly how a nose job or face-lift will look."[30] Another of her more disturbing images, titled "Warhead," shows a computer composite portrait of "the faces of world leaders in proportion to the percentage of nuclear warheads they controlled."[31]

While such radical departures from the norm seem unthinkable in a modern photojournalistic context, the fact that they are now possible casts a degree of doubt and suspicion over the "truth" of all images. Without a solid grasp of photojournalistic ethics, it is possible that a future visual news gatherer could function as a mere assembler of digital data. "A new breed of photographer could emerge, one who goes out and collects images like a reporter collects facts and then comes back and assembles them like a writer writes stories. A series of crude snapshots could thus be turned into photographic masterpieces."[32]

The threat of "abuse by technology" is real. Such ethical disintegration could lead to a demise of photojournalistic principle and purpose. On the other hand, the electronic camera brings with it a potential for great positive change. Photojournalists will be able to work faster and provide more complete coverage than before with the adoption of still-video technology. Media organizations will benefit economically from the elimination of wasteful and time-consuming darkroom processes. Rapid digital transmission systems will provide editors with an abundance and variety of images each day from which to choose.

And the primary beneficiaries of these changes will be the public, who will view the printed results of still-video, fresh scenes of reality captured in pixels, "the digitized moment."

-30-

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